

# MACROECONOMIC ASPECTS OF AGRICULTURAL CREDIT LENDING IN KENYA

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## 1. Introduction

Agriculture greatly determines the performance of Kenya's economy. Its contribution to *Gross Domestic Production* [GDP] during the past 35 years averaged 30%. In addition, agricultural products contribute approximately 70% of the total exports and it can be argued that it contributes significantly to Kenya's foreign exchange reserves. Even where agricultural products are not exported, the availability of adequate food supplies enables the government not to exert pressure on foreign exchange reserves through importation of grains and white sugar from outside the country.

In the current plan period (1994-1996), a growth rate of between 2.5% and 5.1% is envisaged for the entire economy at the time when the agricultural sector registered an average growth rate of 2.6% during the last decade (Godfrey, 1986). Growth in population requires improved supply of food so that the government does not resort to food importation to avoid famine in the country.

Table 1: GROWTH RATES (%) IN GDP

Year:	1965 - 80	1981 - 90	1992	1993	1994
GDP rates	6.8	4.2	0.5	0.2%	3%

Source: *World Development Report* (1993) and *Daily Nation* (1995) 16 June: P. 22.

The period 1981-94 shown in table 1 coincides with the time when agricultural production dropped leading to a drop in GDP growth rate. In addition, the years 1992, 1993 and 1994 agricultural terms of trade showed no improvement in that they remain in the range of 87 - 90 (1982 = 100).

Table 2: Percentage Contribution of Agriculture to GDP

Year	GDP in Million Kenya pounds	Contribution to GDP(%)
1984	1 244.34	32.1
1985	1 357.17	30.7
1986	1 598.05	31.2
1987	1 669.26	29.6
1988	1 902.69	29.4
1989	2 088.39	28.1
1990	2 235.46	25.9

Source: Republic of Kenya, *Statistical Abstracts*. Central Bureau of Statistics, Nairobi, 1991.

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These facts suggest that without good management of the agricultural sector it would be difficult to attain the projected growth in the overall economy.

On the basis of table 2, it can be observed that the contribution of agricultural sector has not only been decreasing in nominal terms but also in real terms given the recent inflationary tendencies the country has experienced.

Inadequate food supply situation has been attributed to factors such as adverse weather conditions, pests and diseases, failure to adopt modern farming practices and poor infrastructure (Rukandema 1978; Kimura 1994). Researchers like Donaldson and VonPischke (1984) have identified lack of financial base for farmers to be a major obstacle to improved agricultural production. This may true given that a major portion of agricultural output is contributed by small scale farmers that own less than 5 hectares of arable land (Lugogo, 1983). This particular class of farmers generally belong to low income groups which can not find it easy to accumulate farming capital through individual savings. All efforts must, therefore, be made to promote this important sector of our economy.

Agricultural credit finance is one important way that can be exploited to assist this sector. Agricultural credit incorporates all loans and advances granted to borrowers to finance and service production activities relating to agriculture, forestry, and fisheries and service processing, marketing, storage and distribution of products resulting from those activities. Policy frameworks have already been put into place by the government to ensure credit flows to the agricultural sectors with poor results. The sector has failed to live to its expectations and the prevailing problems need an urgent redress.

### *1.1 Problem Statement*

Inadequate supply of agricultural credit has been identified as one of the most important constraints to modernising agricultural production (Ijere, 1979). Agricultural credit is needed by farmers to enable them adopt improved modern farming methods which usually involve higher cost of production and to pay for other factor inputs (Ajaykaiye, 1984). Capital is one of the four major factors of employed in agricultural production. It is used in many forms and cash is the most important of all the forms which needs to be provided for in the implementation of any agricultural plan. Like the other factors of production, cash capital is available in limited amounts to the farmers and alternative ways need to be identified to provide the amounts needed for timely and productive implementation of farm plans.

**Table 3:** Number of Loans Approved in 1993/94 Financial Year

Area	TYPE OF SCHEME			Total Small Scale as a % of Total	
	Large Scale	Small Scale	Seasonal Credit		
North Rift	32	106	788	926	(11.2) 11.4
Central Rift	52	222	251	525	(43.4) 42.3
South Rift	30	104	33	167	(52.3) 63.3
Western	6	137	223	366	(16.6) 37.4
Nyanza	6	209	0	215	(91.8) 97.2
Eastern	51	242	40	333	(79.1) 72.6
Mt. Kenya	6	484	22	512	(94.1) 94.5
Coast	2	206	0	208	(90.6) 99.0
Total	185	1710	1357	3252	(50.7) 52.6

Source: Republic of Kenya (1994). Agricultural Finance Corporation, *Statistical Digest*, December, 1994. Figures in parentheses relate to 1989/1990 financial year.

Agricultural production is faced with a lot of risks and uncertainties which make it more difficult for those participating in agricultural production to acquire cash capital. Whether or not all financial institutions can play a positive role in agricultural development has been a hotly debated issue. One school of financial economists led by Cooper and Fraser (1993) believe that commercial banks should be excluded from the field of economic development where agriculture belongs. They have argued that commercial banks exhibit a high degree of risk aversion which can not allow them to place their short term portfolio of liquid assets into economic development areas such as agriculture that may require long term financial commitments. On the other hand, there is a school of economists which maintain that commercial banks provide a natural lubricant into a national economy (Willis 1981). They have argued that without positive contribution from commercial banks, no significant progress could have taken place in industrialised countries. As a result, they see no problem in extending the same role for commercial banks in developing world. Whichever side one wishes to support, there can be no denying that agricultural credit finance is one of the alternative sources of cash capital but it is responsive to the risk rural farming environment and other macroeconomic factors. The macroeconomic monetary and fiscal policies can contribute to a great extent towards the existing risk environment. As a result, the macroeconomic monetary and fiscal variables may affect the extension of credit by the various sources identified. The current dismal performance of the agricultural sector suggest the existence of a problem which can be partially attributed to the credit lending behaviour of the institutions involved. The macroeconomic environment can help us

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understand better these current observations in the sector. The economic environment is affected by such macroeconomic variables as controlled prices of agricultural products such as maize and sugar, interest rates, inflation and the central government budget deficit.

The problem under investigation in this paper concerns the effects of these macroeconomic monetary and fiscal variables on agricultural credit lending which in turn are bound to adversely affect agricultural production. The paper looks into the way agricultural lending responds to these macroeconomic variables as they change from time to time either due to change of policies or market-forces effect.

### *1.2 Justification for the Study*

This study is expected to expose those macroeconomic variables that the policy makers in Kenya must carefully change for the betterment of the agricultural sector if it is to maintain its position as the mainstay of Kenya's economy.

Productive use of agricultural credit would create jobs which is an important aspect of our economy and this study would contribute towards this goal by ensuring the macroeconomic policies are well formulated to favourably affect agricultural credit.

This study is also justified by the priority the Kenya government gives to food self-sufficiency (Republic of Kenya, 1993). Credit related agricultural productivity through efficient policy formulation would encourage more participation in the agricultural sector which would ultimately result in a boost in the desired food reserves. In Kenya, production of cereals and white sugar is known to fluctuate from year to year in the era of a steady increase in consumption by the ever increasing population. This fact is well illustrated by the fact that government had to recontrol price of sugar barely six months after decontrolling. This was viewed as an attempt to check on sky rocketing prices that faced the consumers in 1992.

The study is further justified by the conclusions and recommendations expected which will act as points of departure that can be used in identifying impacts of intended policies and this would save the economy a lot of resources which would otherwise be lost through ad hoc policies.

### *1.3 Research Objectives*

Although there have been some studies on agricultural credit extension, no studies as yet have sought to delineate the macroeconomic policy variables responsible for changes

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in the amount of agricultural credit supplied to farmers in the country. The current study, therefore, develops an econometric model that attempts to identify macroeconomic policy variables responsible for changes in agricultural credit to farmers in Kenya.

The general objective of this study, therefore, is to isolate the macroeconomic policy variables influencing amount of agricultural credit to farmers in the Republic of Kenya. Subsumed in this general objective are the following specific objectives:

- (i) To identify every clear and concise manner the macroeconomic policy variables influencing agricultural lending decisions in Kenya.
- (ii) To quantitatively estimate the effect of selected macroeconomic policy variables on the amount of agricultural loans advanced to farmers.
- (iii) To provide guidelines on how changes in these variables can alter the decision to lend to farmers in the study country.
- (iv) To provide recommendations based on the findings of this study for possible policy interventions that may encourage agricultural credit extension for the benefit of farmers.

## 2. Literature Review

Many academic 'heavy weights' have in previous years under taken studies on this subject of agricultural credit management. Socio-economic research as pertains to agricultural credit management have been undertaken in Kenya in attempts to fully understand the environment under which both the borrowers and the lenders find themselves in. Nevertheless, little seem to have been done and published in Kenya on the impact of macroeconomic policy to agricultural credit. This paper under takes to explore the impact of macroeconomic policy pursued in post independence era on the Kenya's agricultural sector.

Sherphard and Collins (1982) investigated why farmers fail due to farm bankruptcies. They employed an econometric analysis on aggregate time-series farm sector and found that prior to World War II the farm bankruptcy rate in the U.S.A. was associated with financial risks variables while post war data showed a strong association with business risk variables. They also noted that the bankruptcy rate may be influenced by macroeconomic variables, most conspicuous being interest rates (Sherphard and Collins, 1982). This current paper uses the same methodology but varies from that of Sherphard and Collins (1982) in that the macroeconomic variables are explicitly analysed with the view of unearthing their effects on the agricultural loans extended to farmers during the period 1973 to 1992.

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Credit markets differ fundamentally from the market of ordinary goods and services. Consequently, conventional analysis of the loan markets, based on theory applicable to these goods, can be misleading even when similar prescriptions are reached. This was the implication of a study by Virmani (1982) in which he analysed various forms of government intervention in the loan market in terms of their effect on efficiency, providing essential basis for evaluating and judging these intervention policies. The current study was intended to confirm or reject this implication given the different sources of credit that are under investigation.

In a study of farmers' credit risks and liquidity management it was found that credit risks are unanticipated variations in costs and availability of credit that arise from forces in financial markets or from lenders response to risks in agricultural markets and farmers' credit worthiness (Barry et al 1981). An extended mean-variance (portfolio) theory was used by these researchers to show how credit risks combine with other financial and business risks to determine total risk. Farmers credit emerged as positively correlated with changes in farm income. The aspect of farmers' credit worthiness was ignored in this paper and instead of using the mean-variance theory which is more of an allocative means, an econometric model to explore the risk element as would be exhibited by the emerging signs of the econometric analysis of the problem was employed.

In a study on floating versus fixed-rate loans in agriculture and their effects on borrowers, lenders and the agricultural sector; it was found that deregulation, changes in monetary policy and rapidly fluctuating inflation rates do significantly alter the financial market environment in which agricultural lenders and borrowers must operate. Highly variable market interest rates resulted in the non-insulation of the rural lenders from these market forces it has been argued that unexpected fluctuations in interest rates inflicted losses on fixed rate lenders, encouraging them to look for ways to modify their interest rate exposure (La Due and Leatham, 1984). Current study concentrates on the lender and it covers the period when interest rates and prices of essential commodities were not liberalized but under control of the monetary authorities and the government unlike in La Due and Leatham's study where interest rates were floating. Non repayment of agricultural loans could be minimized by efficient techniques of gathering information about potential borrowers and providing incentives for borrowers to repay promptly to maintain access to bank loans which carry sometimes interest rates substantially below equilibrium (Vogel 1986). Vogel (1986) remarked this and also observed that low interest rates may cause farmers especially the small ones to be rationed credit most severely. This researcher, unfortunately, used low delinquency and default rates as primary criteria to measure the

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success of agricultural credit programs in developing countries. This was off the mark. This paper disapproves this argument and implicitly uses the productivity of the agricultural credit as the performance measure by using the amount lent out as a reflection of the credit demand. Our view is that only credit applicants engaged in productive agricultural activity can be expected to seek and obtain loans from the existing institutions. Von Pischke J. D. *et al* (1978) developed a paradigm incorporating financial logic and elements of political economy to explain performance problems found in specialised farm credit institutions (SFCI), like the AFC, found in low income countries. The paradigm assumed that commercial lenders are hesitant to venture into rural lending because of the low returns envisaged from this type of business. The study found that because of the narrowness of the SFCI and their functions, they fail to mobilize rural savings and do not have access to sufficient information about the rural economy to permit them to function dynamically or to gain credibility in the eyes of the rural people they are designed to serve. The paradigm resulted into the conclusion that SFCI have limited scope for internal reform because of their political nature. The current study addresses itself to one such SFCI and this is the Agricultural Finance Corporation (AFC). The econometric analysis is expected to point out whether this institution's performance depends more on the socio-economic and political variations rather than macroeconomic policies. In a report assessing a United States Agency for International Development (USAID) assistance program to Kenya, it was found that the major problems that confronted AFC were as a result of the rapid growth in lending to small farmers unaccompanied by adequate farmer credit education, loan approval procedures, loan supervision or credit review functions (Brown *et al* 1979). The study did not address the important policy implications that tend to create problems to the AFC and it recommended that the cooperative structure should be used to deliver credit to farmers while the AFC serviced the credit needs as those currently addressed by commercial banks, a recommendation that was quite far from reality given the different objectives and regulatory framework of the commercial banks and the AFC.

### 3. Conceptual Framework of the Study

Annual inflation rates, interest rates, government determined prices of essential goods and central government budget deficit are important macroeconomic variables which, apart from the external influence, are also affected by the domestic policy. The domestic macroeconomic policies trigger off transmission mechanisms which culminate in their effect on the agricultural credit amounts. The model formulated in this paper looks into this final results of the transmission mechanism.

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Inflation accelerates the erosion of capital. In addition, it can contribute to the arrears problem particularly in the case of extensively rationed credit. The situation under investigation in this study is not highly rationed and the inflation effect that is of concern is that towards both lenders and borrowers. It would theoretically be expected that a negative relationship should exist between the rate of inflation and the amount of credit advanced to farmers. However, if this amount is as a result of derived demand, a positive sign will be observed in the econometric analysis result.

Interest rates on the other hand represent the cost of capital to the borrower and the expected earning with respect to the lender. Consequently, interest rates which are common to agriculture do not allow lenders to accommodate fully the perceived higher levels of risk associated with the variability found in agriculture. Poor performance by lenders were (Pischke, 1978 *op cit*) found to be self-perpetuating. Subject to concessionary interest rates, lenders ration credit stringently according to commercial criteria. This leads to lending institutions seeking clientele offering greater security and less risk. Low interest rates do not allow institutions a sufficient operating margin to accommodate the higher expense associated with lending to small and new borrowers. To overcome this, additional fees are initiated which raise borrowing costs and restrict small farmers access to credit.

During the study period, producer price of maize, consumer and producer sugar and other essential goods consumed by Kenyan residents were controlled by the government. Setting of these prices by government was meant to encourage farmers to increase production and still protect the urban consumer. These government determined prices received by the farmers constitute their earnings which should enable them cover farm operating costs including financing charges. Given that producer prices and thereafter consumer (retail) prices were controlled, they were therefore meant achieve certain social and macroeconomic objectives at all times. To the extent that prices set outside the forces of supply and demand failed to cover farmers' operating expenses and reasonable return on investment, we a priori expect lagged producer price of maize and consumer price of maize to have negative influence on demand for loans. Perception by farmers of the adequacy of prices set by government can therefore be said to influence their financing decisions. The information content of the same prices may also be expected to influence lenders in their appraisal of default risk.

Given this theoretical basis with regard to interest rates advanced earlier, the model formulated here envisages an indeterminate sign between the agricultural credit advanced and the rate of interest since the sign should depend on the risk aversion of the credit institution.



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The budget deficit is created by increased government spending without a concomitant increase in the recurrent revenue. Lack of budget deficit would theoretically be expected to affect agricultural credit advanced through the interest rates which in turn may be as a result of the crowding-out effect as the government borrows more from the commercial banks. Central government borrowing activities tend to reduce the funds available for lending to agriculture. Consequently, a negative relationship would be expected between the amount of credit and the level of the budget deficit. Owing to the fact that the Government may be unable to raise adequate revenue, it would be expected to resort to heavy borrowing as those reported in the period 1992/93. During this period, Kenya's internal and external debts were reported to be Kshs 88 billion and USD 6.7 billion respectively. With this kind of situation, it may be difficult for agricultural sector to have easy access to invaluable agricultural credit except in situations where such government borrowing support credit services to farmers. In light of this debt position, continued reliance of AFC on government loans and grants may, therefore, be considered to be a thing of the past.

#### 4. Methodology

Research in economics related disciplines is either positivistic, normativistic or pragmatic. Finance is a positive science but agricultural finance does not necessarily deal only with positive aspects. The methodology employed in agricultural finance, like in most other disciplines, depends on the end-use of the results obtained. Microeconomic research employs mainly positive methods. If the research is after problem - solving, normative methodology is appropriate.

Pragmatic methodology is most useful for research that is undertaken for policy analysis. Consequently, this paper is based on a pragmatic research methodology which incorporates the interdependence of positivism and normativism. The use of the available data gives the positivistic aspect while the policy implications as a result of the analysis use the notion of normativism telling us what the situation ought to be like.

##### 4.1 *The Analytical Model*

The theoretical framework outlined in the previous section resulted into the use of an econometric model which assumes that amount of agricultural loans made in a given year was determined by prevailing inflation, lagged consumer sugar price, central government spending activities as measured by budget deficit or surplus, interest rates and lagged

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producer maize price:

$$Y_t = \beta_0 + \beta_1 I_t + \beta_2 R_t + \beta_3 D_t + \beta_4 S_{t-1} + \beta_5 M_{t-1} + \mu_t \quad (1)$$

where;

$Y_t$  is the amount of the loans advanced in monetary terms in year  $t$ .

$I_t$  is the rate of inflation as measured by the economy's consumer price index in year  $t$ .

$R_t$  is the real lending rate of interest in year  $t$ .

$D_t$  is the government's budget deficit in a given year,  $t$ .

$\mu_t$  is the error term.

$t = 1973, 1974, \dots, 1992$ .

$\beta_1, \beta_2, \beta_3, \beta_4$  and  $\beta_5$  = unknown parameters to be estimated.

$S_{t-1}$  = Consumer price of sugar in period  $t-1$

$M_{t-1}$  = Price of maize per 90 kilograms bag in period  $t-1$

This model was estimated under three situations and these were:

- (i) with the total agricultural credit as the dependent variable ( $Y_t^*$ ).
- (ii) with the commercial banks credit to agricultural sector as the dependent variable ( $Y_t^{**}$ ).
- (iii) with the AFC's credit to the agricultural sector as the dependent variable ( $Y_t^{***}$ ).

The model coefficients derived using equation (1) were used to estimate the elasticities of loan amount granted with respect to the macroeconomic policy variables investigated in this study. The objective was to establish the nature of the relationship between the criterion variable and the macroeconomic variables, the size and direction of percentage change in agricultural loans granted as a consequence of a unit change in the selected predictor variables. At the same time able to gauge the relative importance of policy variables in question. The relative importance of a predictor variable was gauged using the absolute values of regression coefficients estimated through the analysis. The same coefficients and mean values of the study variables provided the basis of estimating average elasticities.

#### 4.2. Statement of Hypotheses

The main operating hypothesis in this study was that the macroeconomic policy variables have negligible effect on the amount of agricultural loans given to farmers. This was also specified as follows:

$$H_1 : \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0 \quad (2)$$

$$H_a : \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0 \quad (3)$$

The null statistical hypothesis ( $H_1$ ) as specified suggests that the macroeconomic policy variables have no effect on the amount of loans advanced to farmers. The related alternative hypothesis ( $H_a$ ) maintains that at least one of the three predictor variables used in the study has significant influence on agricultural credit in the economy. Statistical tests of significance were used to find out regression coefficients, if any, that were significantly different from zero.

## 5. Empirical Multiple Regression Results

The model was estimated using time-series data relating to the amount of loans advanced by the commercial banks and AFC to the agricultural sector for the period between 1973 and 1992. The explanatory variables as defined in the model were the rate of inflation, the real lending interest rate and the central government's budget deficit, lagged producer prices of maize and lagged consumer price of white sugar. The three estimated equations were.

**Table 4:** Total Agricultural Credit (Yt\*) as the Dependent Variable

Variable	Coefficient	Std. Errors	T- Value	P- Value
CONSTANT	-230.069	1148.772	-.200	0.844
Real Interest	151.494	122.361	1.238	0.235
Annual Inflation	131.305	111.017	1.183	0.255
Budget Deficit	3.771	2.218	1.700	0.110
Maize Price	-12.236	11.976	-1.022	0.323
Sugar Price	264.897	80.384	3.295	0.005

$R^2 = 0.748$  F-Statistic = 8.884 Durbin-Watson Test = 2.285 Durbin-Watson Bounds = (0.56, 2.21)

**Table 5:** Credit from the Commercial (Y\*\*) as the Dependent Variable

Variable	Coefficient	Std Errors	T-Value	P-Value
CONSTANT	-1118.303	373.261	2.996	0.090
Real Interest	43.896	39.758	1.104	0.287
Annual Inflation	75.310	36.072	2.088	0.054
Budget Deficit	0.378	0.721	0.525	0.608
Maize Price	-11.553	3.891	-2.969	0.010
Sugar Price	293.408	26.118	11.233	0.000

R<sup>2</sup> = 0.961 F-Statistic = 99.137 Durbin-Watson = 1.426 Durbin-Watson bounds = (0.56, 2.21)

**Table 6:** Credit From the Agricultural Finance Corporation (Y\*\*\*) as the Dependent Variable

Variable	Coefficient	Std. Errors	T-Value	P-Value
CONSTANT	369.174	127.947	2.885	0.011
Real Interest	6.787	13.628	0.498	0.626
Annual Inflation	1.584	12.365	0.128	0.900
Budget Deficit	0.156	0.247	0.634	0.536
Maize Price	0.094	1.334	0.070	0.945
Sugar Price	4.971	8.953	0.555	0.587

R<sup>2</sup> = 0.301 F-Statistic = 1.294 Durbin-Watson = 1.362 Durbin-Watson bounds = (0.56, 2.21)

**Table 7:** Correlation Matrix

	Y*	Y**	Y***	I <sub>t</sub>	D <sub>t</sub>	R <sub>t</sub>	M <sub>t-1</sub>	S <sub>t-1</sub>
Y*	1.000	0.882	0.593	0.442	-0.423	0.581	0.720	0.830
Y**		1.000	0.495	0.451	-0.618	0.530	0.760	0.967
Y***			1.000	0.303	-0.266	0.474	0.507	0.486
I <sub>t</sub>				1.000	-0.571	0.401	0.763	0.521
D <sub>t</sub>					1.000	0.526	-0.692	-0.673
R <sub>t</sub>						1.000	0.803	0.644
M <sub>t-1</sub>							1.000	0.868
S <sub>t-1</sub>								1.000

i) Those correlation coefficients with absolute value  $\geq 0.65$  are significant at 1% level of significance, (ii) correlation coefficient with absolute value of  $\geq 0.49$  are significant at 5% and (iii) correlation coefficients with absolute value  $\geq 0.44$  are significant at 10% level of significance.



### 5.1 Empirical Stepwise Regression Results

$$Y_t^* = 336.875 + 179.540S_{t-1} \quad (4)$$

(0.490)      (6.394)

$$R^2 = 68.3\% \quad F\text{-value} = 40.881 \quad P\text{-value} = 0.000$$

$$Y_t^{**} = -1000.824 + 274.774S_{t-1} + 44.847I_t - 7.980M_{t-1} \quad (5)$$

(-2.842)      (13.638)      (1.866)      (-3.879)

$$R^2 = 96.2\% \quad F\text{-value} = 171.424 \quad P\text{-value} = 0.000$$

$$Y_t^{***} = 369.725 + 0.560M_{t-1} \quad (6)$$

(6.586)      (2.563)

$$R^2 = 25.7\% \quad F\text{-value} = 6.568 \quad P\text{-value} = 0.019$$

*T-values shown in parentheses.*

### 5.2 Discussion of the Results

The model 2, as shown in table 5, of the three fitted models gives the best fit in terms of coefficient of determination ( $R^2$ ) given that the five explanatory variables explain well over 96.1% of the variation in the agricultural credit from commercial banks. Model 1 as shown in table 4 is the second best fit for it is able to explain 74.8% of total variability in the amount of total loans supplied by both commercial banks and AFC. Model 3 in table 6 provided us with a coefficient of determination of 30.1%. Given that  $R^2$  is less than 50% we conclude that the five variables are not able to explain a significant proportion of variability in agricultural loans from AFC. This may not be surprising given that part of AFC's credit take the form of credit in form of fertilisers and seeds given to farmers under seasonal credit scheme.

The three estimated models as given in tables 4, 5, and 6 were found to have  $F$ -ratios that were established to be significant at levels of significance of 0.0004, 0.0000 and 0.3179 respectively. This led us to conclude that there exists a strong statistical relationship between the five predictor variables and the criterion variables as defined under models 1 and 2 at  $\alpha = 0.05$ . We failed to find a strong regression between the selected five predictors and loans granted through AFC at the same level of significance.

The signs of regression coefficients as show in these multiple regression model fitting and stepwise regression results imply that the total agricultural credit lending was positively influenced by the lagged consumer price of sugar in the Kenya's economy during the study period. This positive association between lagged consumer price of sugar and

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total agricultural credit may be understood in the context of the existing price controlled market. Firstly, during the study period the price of sugar was controlled by the government and it would appear that steps by the government to increase both producer and thereafter consumer price might have led to increase in prices of farm inputs which meant increased demand for short term funding. This is because sugar and maize are basic consumable commodities whose price was considered to have effect on domestic budget of most households and then production costs. It follows that it is was rare during the period for the price of sugar to rise without prices of other goods and services required by farmers going up. Kenya's agricultural sector relies on imported chemical fertilisers which were also listed under price controlled items. It is possible that an increase in the price of chemical fertilisers could have occasioned an adjustment in producer price of sugar and other agricultural products thus leading to increased demand for agricultural loans. Secondly, Kenya has never had a prolonged period of sugar sufficiency. In most cases it has had to import at least 15-20% of sugar consumed in the country (GOK 1991) and therefore cost-insurance freight (CIF) based price of sugar used during this period to set consumer price may have been perceived by farming community to be higher than price of locally produced sugar; in which case farmers were motivated to take more loans to produce most of essential goods, including sugar, required for consumption in the country.

On the basis of table 4 and 5, the positive regression coefficients of annual inflation rate and real lending interest rate suggest that an increase in annual inflation rate leads to increased demand for agricultural credit by farmers for purposes of meeting cash expenses. The positive regression coefficient of real lending interest rate in model 2 may be attributed to the fact that commercial banks are normally after profitability and an increase in real interest rate enables them to extend credit at a return capable of covering costs. Also real interest encourages saving deposits which enables commercial banks to loanable funds. It can therefore be concluded that low real interest can discourage savings which may adversely affect agricultural lending activities of institutions involved in credit extension.

The significant positive regression coefficient of budget deficit in model 1 suggest that an increase in central government spending, with other things constant, facilitates increased agricultural credit. This may be true only if part of budget deficit results from the government efforts to support AFC and other commercial banks owned by the government in their agricultural lending activities. At the same time the positive regression coefficient of budget deficit may be suggest that money raising activities executed by the central government may enable commercial banks to invest in relatively risk free government

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securities. These relatively safe treasury securities used to finance government deficit provide commercial banks with relatively safe revenue source which may facilitate agricultural credit extension. Alternatively, if the budget deficit is as a result of government efforts to purchase cereals in pursuant of strategic food reserve policy this may have led to producer price offered to farmers being perceived by them as reasonable and thus encouraging them to go for more agricultural loans to increase production.

From the foregoing it can be said that the performance of the economy in general as reflected through levels of inflation, real interest and government fiscal policies can have a role to play on agricultural lending activities in the country and can not be ignored. Thus there is no reason to prevent the institutions involved in agricultural lending from being responsive to changes in the macroeconomic environment.

On the basis of the results presented in tables 4 and 5, the negative regression coefficient of lagged producer price of maize indicates that an increase in producer price of maize results into increased revenue for the farmers which may be easily used by the farmers to finance their short term farming needs. Another interpretation that may be accorded to this type of relationship can be found in the price controls that prevailed during the study period. To the extent that farmers perceived CIF based price of maize to be lower than price given to farmers outside Kenya it would be possible for farmers to be less enthusiastic to produce more thus reducing the loans granted. In light of a negative correlation coefficient between lagged producer price of maize and budget deficit, it appears that government incurs a budget deficit in attempt to support price of maize by purchasing from farmers cereals under strategic food reserve policy. This being the case if imported maize is subsidised by the government farmers may view the controlled price to be less than enough to cover production costs in which case they will be less inclined to take up loans.

The regression coefficient of lagged producer price of maize shown in model 3 contrasts sharply with that of models 1 and 2. Although not statistically significant this positive regression coefficient implies that an increase in government controlled price of maize leads to an increase in amount of agricultural loans channelled to farmers through AFC. This may be attributed to the fact that farmers who seek AFC financing view an increase in maize producer price to increase their ability to pay loans granted as both National Cereals Produce Board and AFC are government owned institutions which enjoyed the support of the government and worked together to support farming efforts of farmers. Alternatively, this type of relationship between lagged producer price of maize and AFC loans may suggest that farmers who opted for AFC loans are those engaged in production of maize.

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As a result they are more inclined to respond favourably to a price increase.

It is important to note that the results of model 2 are consistent with those of model 1 and this is because the commercial banks contributed a very big percentage of the cash capital lent out to the agricultural sector during the study period. AFC is also known to extend credit to small scale farmers in non cash form. It is also worth noting that the relatively high coefficient of determination ( $R^2$ ) for model 2 suggest that the five variables included in the estimated multiple regression model reflect the relevant information required to explain variability in the amount of loans supplied to farmers from commercial banks. However, coefficient of determination of 75% for model 1 shows that other important variables not included in the estimated model account for 25% of total variability in total agricultural credit. These other variables could be the major variables not captured in model 3.

Analysis of the three models show that the annual rate of inflation is positively related to the amount of cash capital advanced to the agricultural sector. The positive regression coefficient of annual inflation in the three fitted models could alternatively suggest that the rate of inflation could have resulted from higher import prices and since a substantial portion of the inputs used in the Kenyan agricultural sector are imported, the demand for agricultural loans is expected to increase under inflationary conditions in order to cater for this rise in import value. These results lead to the conclusion that the amount of credit that is advanced to the agricultural sector is more of a derived demand than supply by the credit institutions.

The real lending rate of interest is also positively related to the amount of money lent out as shown in three models in tables 4, 5 and 6. This suggests that the lending decision lies with the institution rather than the borrower despite the observation made above to the effect that credit is a derived demand item in Kenya. Financial theory suggests a negative relationship on the understanding that borrowers have more say and there is competition among lenders. However, if the lender determines whether to lend or not as suggested by these models, then the observed sign is consistent with the classical theory of the firm as a profit maximiser where the lenders take the rate of interest as the return on every shilling lent out. According to stepwise results, lagged consumer price of sugar, annual inflation and lagged producer of maize were found to be the most statistically significant contributors to agricultural lending from commercial banks in Kenya. However, only lagged producer price of maize was found to be the only most significant variable in the case AFC and lagged consumer price of sugar was found to be the most significant variable in the case total agricultural lending unlike in the commercial bank agricultural lending case. This

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result may be attributed to the fact that financial institutions tend to judge the ability of loan applicant to pay in the context of macroeconomic variables impinging on the farm enterprise. For purposes of deriving stepwise results, the level of significance was set at 10% for variable selection through forward stepwise procedure.

During the study period interest charge on loans for AFC did not change with forces of demand and supply and hence an increase in maize of price might have meant farmers finding it easy to service AFC loans unlike those from commercial banks. Since its inception, AFC has always relied on government loans and grants as a source of funds advanced to the agricultural sector such that the rate of interest charged failed to reflect the financial reality prevailing in the Kenya's financial sector. However, prices of the two commodities seem to capture the nature of the macroeconomic environment under which farmers found themselves. The agricultural credit from AFC to farmers has for quite some time attracted 12% interest rate on per annum basis. This rate is low when compared with the mean prime lending rate ranging 15% - 22% charged by other financial institutions under a liberalised environment during 1994 and after.

Considering regression coefficients of annual inflation, lagged price of sugar and real lending interest rate the results of models 2 and 3 appear consistent with those of model 1 further suggesting that much of the agricultural credit in Kenya comes from the commercial banks which tend to be more profit oriented. However, it is doubtful that commercial banks loan advances end up in the pockets of to small scale farm holders for it usually difficult for this class of farmers to meet the stringent lending requirements stipulated by most commercial banks.

On the basis of our analysis, there are two ways in which the budget deficit can affect the agricultural sector. Firstly, the deficit can be financed through increased agricultural taxation and secondly, through increased borrowing from both internal and external sources by the central government. Increased taxation on farm income like the one which occurred through implementation of presumptive income tax, formerly repealed and reintroduced in 1995, deprives the farmer internally generated cash capital. The three models indicate a positive relationship between budget deficit and the criterion variable thus suggesting a supportive role from the government in favour of agricultural lending. During the current plan period, the government has envisaged to reduce budget deficit to zero by 1995/96 down from 8% in 1988/89. In the event that this good public relations announcement succeeds then it can be argued that AFC which enjoys government funding may have to be self supporting in entirety if reduced budget deficit implies withdrawal of government support. The positive relationship between total agricultural

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credit and budget deficit as revealed in model 1 is contrary to the financial theory. However, they suggest more expenditure by the government towards agriculture without corresponding increase in agricultural taxation. The increase government spending, however, is now on the decrease. At this juncture, it can be concluded that during the period under study, increased agricultural credit support took place at the time when the sector did not get heavily taxed by the government.

### *5.3 Correlational Analysis*

On the basis of correlation analysis results shown in table 7, it can be observed that government budget deficit has a significant negative correlation with commercial bank agricultural loans indicating negative influence. The same budget deficit is significantly correlated with annual inflation rate, real interest rate, lagged price of sugar and lagged producer price of maize. This suggests that increase in government spending leads to withdrawal of liquidity from the hands of the consuming public hence low annual inflation rate. This low inflation rate leads to high real interest rates for the period. Government efforts to subsidise producer prices of maize and consumer price of sugar can be inferred from the significant correlation coefficient between lagged producer price of maize and consumer price of sugar. Lagged producer price of maize and consumer price of sugar have a significant positive correlation with agricultural loans suggesting that increase in prices lead to increase in loans given to this sector by institutions involved. Prices of the two commodities are also seen to be critical in the determination of annual inflation rate. Thus stability in the prices of the two commodities can guarantee low inflation rates and hence positive real interest rates. This is likely to be the case if the government does not distort interest rates in the economy in any other way.

### *5.4 Elasticities*

The estimated quantity of elasticity of total agricultural loans with respect to each of 5 explanatory variables used in the study are shown in table 8 along side descriptive statistics. These results lead to the conclusion that changes in total agricultural credit with respect to lagged retail price of sugar are elastic. That is, a unit change in lagged price of sugar will lead to a more than proportionate change in the amount of total agricultural loans advanced to farmers. The same was established with respect to agricultural loans from commercial banks.

The estimated average elasticities were derived using regression coefficients of fitted

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multiple regression model and the mean values given in table 8. These estimated elasticities were meant to facilitate the appraisal of responsiveness of agricultural loans to changes in the selected macroeconomic variables investigated in this study. Our expectations are that the information will assist those in charge on macroeconomic management appreciate the critical features of their policy instruments.

**Table 8:** Descriptive Statistics and Elasticities

Variable	Mean	Std Dev	Minimum	Maximum	Elasticity
Y1*	4032.99	2942	564	1037.5	-
Y1**	3855.46	2802.74	319.1	9613.6	-
Y1***	475.59	196.99	160.4	904.5	-
It	15.19	8.72	5.70	46.00	0.495
Rt	0.94	7.66	-10.2	26	0.035
Mt-1	185.77	175.19	43.2	857.4	-0.564
Dt	279.54	252.17	-907.2	264.4	-0.261
St-1	20.59	13.54	4.5	52.4	135.24

## 6. Conclusions and Policy Implications

The analysis of the data have shown that the commercial banks are the most important institutions at extending the much needed cash capital required by the agricultural sector. This conclusion imply that most of the financial institutions in the Kenya's economy recognise the role played by agriculture and comply with the requirement that they lend 17% of their total deposits to the agricultural sector.

The results of the three models lead to the conclusion that the amount of credit that is loaned to the agricultural sector is a derived demand. The credit institutions supply only what is demanded by the farmers whose response is triggered by price level of the essentials goods in the country. As a result, it can confidently be concluded that the causal link between the rate of inflation and the amount of agricultural credit from commercial banks is a positive one.

Much as the credit advanced to the agricultural sector is a derived demand, it is the credit institutions that make the final decision on whether to loan out money or not within the government controlled market, for both money and essential commodities. This is the reason why a positive relationship was observed between lending rate of interest and the amount of credit. The positive relationship also leads to the conclusion that there is no perfect competition in the credit market and there is a likelihood of collusion among the different lenders. The analysis also lead to the conclusion that effects of government

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financing activities do always adversely affect credit extension activities of the institutions involved. However, the casual relationship between the level of budget deficit and the amount of credit can be said to be indeterminate for the type of relationship observed may depend on other government activities. The concluding remarks of this paper paint a picture that is quite different from what most people especially, the policy makers, would expect. However, based on the observations, analysis and the conclusions, the following are main implications of this study:

- i) Since the commercial banks contribute the highest amount of credit to the agricultural sector, and they are very sensitive to the prevailing economic environment, the economic managers should do their best in providing a conducive economic environment for continued development of the financial sector. Anything thing that is done to improve farmers' returns on investment would be expected to enhance chances of agricultural lending from commercial banks. The commercial banks should also be encouraged to continue adhering to the 17% agricultural credit policy. The on going deregulation of commercial banking sector may be expected to enhance this role played by these financial institutions.
- ii) Given that there is a positive relationship between the interest rates and the amount of credit, despite the latter being a derived demand, the government should shield the farmers against unscrupulous commercial bankers who may collude to raise the rates of interest. This is very likely to occur especially at present because of the liberalised financial markets. The agricultural sector should be given subsidised rates if it has maintain the its contribution towards economic growth. With government funds getting scarce, it may be advisable for the cooperative body like Kenya Grain Growers Cooperative Union strengthened to support farmer activities by ensuring delivery of inputs at reasonable cost.
- iii) The central government should stop market distorting activities and allow the prevailing prices for essential commodities guide the participants in agricultural finance market. The desired reduction in budget deficit should be encourage if it can improve on efficient delivery of credit to farmers in a more competitive and efficient way. Such reduced budget deficit without a corresponding increase in taxation of farm income may eliminate the crowding out effect which is counter-productive to economic growth and development especially for an economy that is predominantly agricultural.
- iv) The economic managers should look for means and ways of curbing inflation in order to improve real interest rates that may be used to encourage commercial lenders extend credit to the farming community. This is much more necessary with respect to



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imported inflation. This can only be done through subsidization of the agricultural inputs or by the government encouraging import substitution for those inputs that Kenya may have comparative advantage.

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**Abstract**

*This study attempted to unearth the influence of macro-economic monetary and fiscal variables on agricultural credit lending made through Agricultural Finance Corporation (A. F. C.) and Commercial Banks during the period 1973 to 1992. The results showed high and significant association between total agricultural lending and government controlled lagged producer price of maize, lagged consumer price of sugar and annual inflation rate. The results further revealed that there are other important variables that influence A. F. C. agricultural lending which are not reflected in the three macroeconomic variables investigated. We conclude that overall performance of the economy affects and is affected by agricultural lending activities of both A.F.C. and commercial banks*